RTO #4 Strategic Planning and Replanning Concept Development



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Objective

Develop a Flight Deck/AOC strategic flight planning (and replanning) concept including:

- -Functional design of concept
- Detail flight crew/dispatcher interaction

Task(s)

- Survey of Dispatcher-related inefficiency in flight planning and replanning
- Post-Operations Evalution Tool (Metron), an examination of replanning inefficiency (uses Airline and ETMS data for the same flights)
- Ultimate Flight Planner, developed a specification for a flight planning DST that can be hosted on the ground or in an aircraft

Results (www Analysis)

Link Placed on Airline Dispatch Federation Home Page

www.dispatcher.org

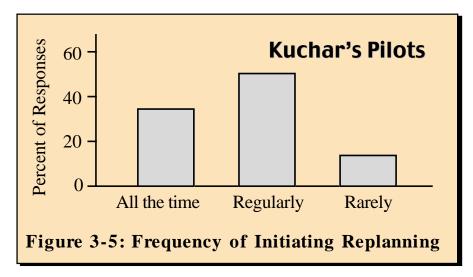
Dispatcher Demographics

Experience Level	Average	Standard Deviation
"Low Time" N=41	3.6 Years	2.3 Years
"High Time" N=31	18.3 Years	7.6 Years

Results (www Analysis)

Frequency of "Replan" Events

Dispatcher	Percentage of Flights	Percentage of Replanned Flight that
Experience	Replanned	Require Replanning
Low Time (<10 yrs)	10% (SD 9%)	7% (SD 12%)
High Time (>10 yrs)	18% (SD 17%)	11% (SD 12%)



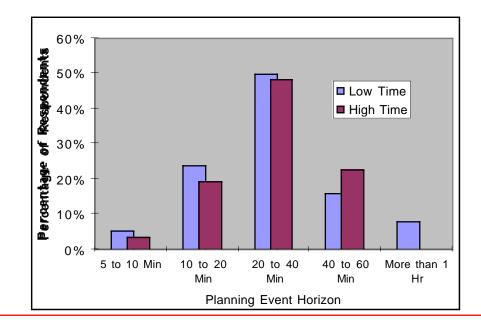
Results (WWW Analysis)

Kuchar's Pilots

Table 3-5: Mean Delay Between Diversion Decision and Request to ATC

Time Horizon	Median Frequency	Standard Deviation
< 1 minute	0.5	0.36
1 - 5 minutes	0.4	0.29
5 - 30 minutes	0.1	0.23
> 30 minutes	0	0.08
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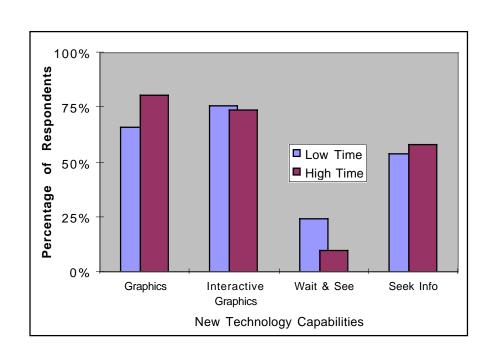
Diversion/Replan Event Horizon

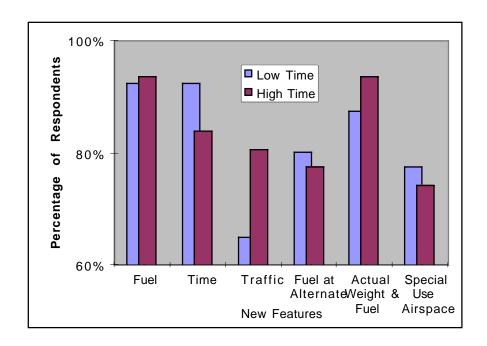


Results (www Analysis)

If only I could've had a ____?

What Dispatchers want for Automation (DST) improvements.





Results (POET Analysis)

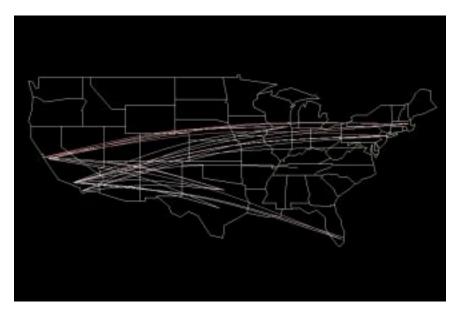
Eastbound vs. Westbound Flights

In our analysis we found that *eastbound flights were inefficient significantly more often than westbound flights*. This trend appears to occur throughout the NAS, and not in specific regions. One possible explanation is that westbound flights want to avoid the jet stream (headwinds) which is easier to do and less affected by reroutes (because there is more space outside the jet stream). In contrast, eastbound flights trying to take advantage of the jet stream (tailwinds) may be more sensitive to reroutes taking them out of the favorable wind pattern. This explanation is tentative and requires further investigation.

Reroute Inefficiencies

We looked at the correlation between inefficient flights and flights that were significantly rerouted and found that the significant rerouting of a flight is not a strong predictor of its inefficiency. We found that over half of the inefficient flights were not significantly rerouted. Conversely, we found that only fifteen percent of the rerouted flights were inefficient compared to thirteen percent for all flights. Significant reroutes do appear to be a contributing factor to inefficiency, but not the primary cause.

Results (POET Analysis)



Westbound flights to CA airports
White = 0% inefficient
Full red = 50% inefficient

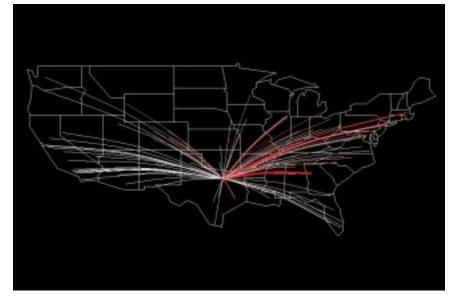


Eastbound flights from CA airports
White = 0% inefficient
Full red = 50% inefficient

Results (POET Analysis)



Flights into DFW
White = 0% inefficient
Full red = 50% inefficient



Flights out of DFW
White = 0% inefficient
Full red = 50% inefficient

Results (Ultimate Flight Planner)

Flight Data **Equipment Data** Route Data **Airport Data** Schedules A/C Performance Airways Airport Leg Information A/C Restrictions **Points** Station A/C Routing Equipment Orig/Dest Records Segments **Route Text** Special Tracks Overflight Fees **Crew Systems Dispatch Environmental** Restricted Airspace **Control System Crew Qualifications** Flight Data **Crew Member Names** · En route Points Invut Altitudes **On-Board Flight** Flight Planning System Segment Fuel **Management Systems Optimum Route** New information Flight History ACARS **Legal Fuel Rqmts** sources are being **FMC** Reclearance Existing Existing Perf Database Computer **Equal Time Point Load Planning System** Interfaces Interfaces integrated in an System Ferry Fuel Payload Performance **Alternate Calculation** Release Fuels informal manner. Management System Take-Off Power Output Information Flight Plan Filing Flight Plan Documents **Field Maintenance** ATC Filing Flight Plan **Reliability System** Abbreviated Flight Plan ICAO Filing Weather Service System Minimum/Selected ARINC Weather Briefing Upper Air Weather **Equipment List** Pilot Alerts Weather Aircraft Restrictions Flight Attendant Plan Termina Probationary Form Turbuler Pilot Self-Acquisition Airport Analysis CDM/AOCnet Airport Arrival Rate Slots Volpe/AOCnet Traffic/Congestion

Conclusion(s)

- Replanning, as currently performed, is not a great source of inefficiency, but is inefficient as a process in and of itself
- Forward (or Proactive) Replanning may be a huge opportunity for lowering Direct Operating Costs
 - Free Flight (reaction to tactical traffic situations)
 - Coded SWAP routes (reaction to ground-based Wx initiatives)
 - GDP/CDM (reaction to ground-based traffic situations)
- The integration of a strategic planner function has to integrate information from both airborne and multiple ground-based sources in order to maximize benefit